PACSystems™ RX3i

IC695NIU001

Ethernet Network Interface Unit

GFK-2419D
July 2006

The PACSystems RX3i Ethernet NIU, IC695NIU001, makes it possible to use PACSystems RX3i and Series 90-30 I/O remotely on an Ethernet network. Once set up by configuration, data exchange is completely automatic. System control can be provided by any GE Fanuc master device capable of exchanging Ethernet Global Data. The Ethernet NIU automatically provides the controller with status information in each exchange. The application program logic in the controller can monitor this status data, and issue appropriate commands to the Ethernet NIU.

An RX3i Ethernet NIU station consists of:

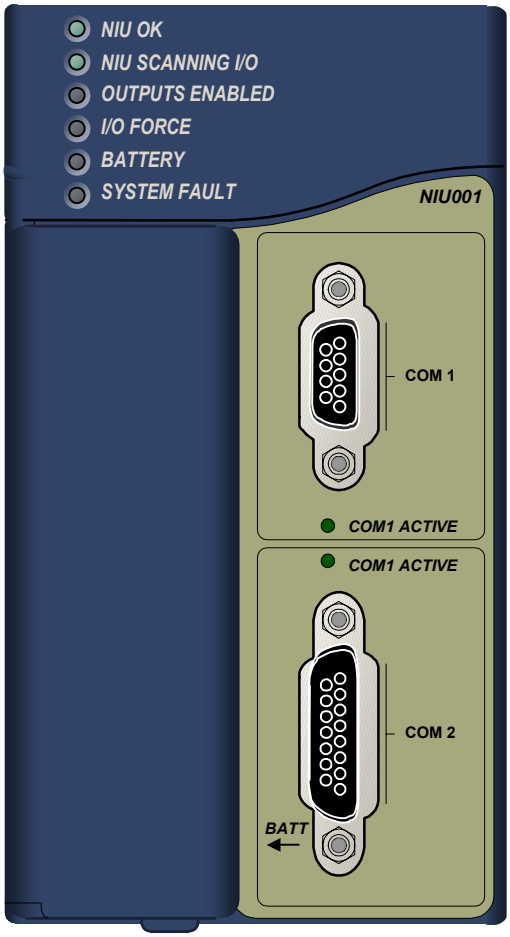
- an RX3i Universal Backplane (IC695CHS0xx)
- an RX3i power supply (IC695PSxxxx)
- the RX3i Ethernet NIU (IC695NIU001)
- one or more RX3i Ethernet modules (IC695ETM001)
- proprietary application software
- Optional Series 90-30 expansion backplanes.
- PACSystems RX3i and/or Series 90-30 modules, as appropriate for the application.

The Ethernet NIU is compatible with the same types of modules, backplanes, and other equipment as a PACSystems RX3i CPU. For a list of compatible products, see the *PACSystems RX3i Hardware and Installation Manual,* GFK-2314.

This module requires Machine Edition Logic Developer software, version 5.51 or later.

Ethernet NIU Features

- 20Kbytes of optional local logic. Supports all languages except C programming.
- 10 Mbytes of battery-backed CMOS RAM memory for local data storage.
- 10 Mbytes of built-in flash memory for local user data storage. Use of this flash memory is optional.
- Battery-backed calendar clock.
- In-system upgradeable firmware.
- Two serial ports: an RS-485 serial port and an RS-232 serial port.
- Supports Ethernet communications via the backplane-based Ethernet Interface module (IC695ETM001)
- Data exchange using Ethernet Global Data (EGD)
- TCP/IP communication services using SRTP
- Comprehensive station management and diagnostic tools
- Supports operation with redundant controllers
- PACSystems RX7i and RX3i controllers can send selected COMMREQs to the RX3i ENIU via Ethernet Global Data. The ENIU executes the COMMREQs and returns the results to the controller.
- During EGD configuration, RX3i Ethernet interfaces are identified by their Backplane/Slot location.



Ethernet Global Data Features

The Ethernet NIU communicates with its controller via Ethernet Global Data exchanges. One exchange is used to send outputs to the ENIU and another exchange is used to send inputs back to the controller. The ENIU supports receiving outputs from redundant controllers. By sending the EGD exchange to a group address both controllers can receive the inputs. Up to 1300 bytes of outputs can be sent to a set of ENIUs from a controller. Each ENIU can send up to 1300 bytes of inputs to the controller.

A typical system might consist of a controller with five ENIUs. The controller sends 1300 bytes of outputs and each ENIU sends 100 bytes of inputs to the controller. This typical system would have its I/O updates occur in less than 25 milliseconds. If the controller scan time is greater than 25 milliseconds, the update occurs at the controller's scan rate. This performance timing is a guideline, not a guarantee, and assumes that there is no other traffic on the Ethernet link to the I/O. More performance data for other system configurations can be found in the Ethernet NIU Manual, GFK-2196A or later.

ENIU COMMREQ Feature

The ENIU supports selected COMMREQs that are sent to it by a "C" block application in a PACSystems Rx7i or RX3i controller. Ladder code is written in the RX7i or RX3i to interface to the "C" block which results in COMMREQ commands being sent via a EGD Exchange to the ENIU. The ENIU executes the COMMREQ and sends the results back to the RX7i or RX3i via another EGD exchange.

The following COMMREQs are supported:

- Modbus Master – function codes 1, 2, 3, 4, 5, 6, 7, 15, 16, 17
- Genius – enable/disable outputs, switch BSM, clear fault, clear all faults, assign monitor, read diagnostic
- Profibus Master – Commreqs 1, 2, 4, 5, 6
- Motion (DSM314/DSM324) – load parameters
- High Speed Counter – Data command
- DeviceNet Master – Commreqs 1, 4, 5, 6, 7, 9
- Analog Module – HART Protocol Commreqs

Operation, Protection, and Module Status

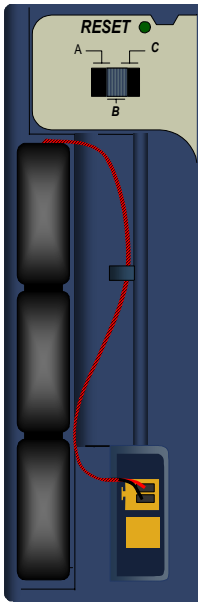
Operation of this module can be controlled by the three-position RUN/STOP switch or remotely by an attached programmer and programming software. Program and configuration data can be locked through software passwords. The status of the NIU is indicated by the eight NIU LEDs on the front of the module. (See "LED Operation").

Battery

A three-cell lithium battery pack (IC698ACC701) is installed as show below. The battery maintains data memory when power is removed and operates the calendar clock. Program and initial values are always loaded from flash when the ENIU powers up. When replacing the battery, be sure to install a new battery before disconnecting the old one.

Disposal of lithium batteries must be done in accordance with federal, state, and local regulations. Be sure to consult with the appropriate regulatory agencies before disposing of batteries.

To avoid loss of RAM memory contents, routine maintenance procedures should include scheduled replacement of the NIU's lithium battery pack. For information on estimating battery life, refer to the *PACSystems NIU Reference Manual,* GFK-2222.



Installation

It is the responsibility of the OEM, system integrator, or end user to properly install the control system equipment for safe and reliable operation. Installation should not be attempted without referring to the *PACSystems RX3i Hardware and Installation Manual,* GFK-2314.

1. Make sure that backplane power is off.
2. Install the NIU module in backplane 0. The NIU requires two slots and can use any slots except the highest numbered (rightmost) slot. It is recommended that the ENIU be located in slots 2 and 3. For more information about choosing a slot for the ENIU, see below.
3. Turn on power. The module should power up. When the NIU has successfully completed initialization, the NIU OK LED stays on and the NIU SCANNING I/O and EN LEDs are off.
4. To save battery life, do not connect the battery for the first time until the ENIU is installed in the backplane and the backplane powered on. The battery may then be attached to either of the two terminals in the battery compartment. Once that is done, the ENIU may be

powered down and normal battery back up operation will begin.

Backplane Locations for the ENIU

1. The A/C Power Supply (IC695PSAx40) for the RX3i is a doublewide module whose connector is left-justified as viewed when installed in a backplane. It cannot be located in slot 11 of a 12-slot backplane or slot 15 of a 16-slot backplane. No latch mechanism is provided for the last (rightmost) slot in a backplane, so it is not possible to place the power supply in the second to last slot.
2. The RX3i ENIU (IC695NIU001) is a doublewide module whose connector is right-justified as viewed when installed in a backplane. The ENIU is referenced for configuration and application logic by the leftmost slot occupied by the entire module, not by the slot the physical connector is located in. For example, if the ENIU has its physical connector inserted in slot 3, the module occupies slots 2 and 3 and the ENIU is referenced as being located in slot 2.
   - The ENIU may be located in slot 0 with its connector in slot 1.
   - The ENIU cannot be located in slot 11 of a 12-slot backplane or in slot 15 of a 16-slot backplane, because its connector cannot be installed in the slot reserved for an expansion module.
3. When migrating a Series 90-30 ENIU system to a PACSystems RX3i ENIU, maintaining the slot 1 location of the ENIU means that only a singlewide power supply may be used in slot 0. Either DC power supply can be used (IC695PSD040 or IC695PSD140). Therefore, if the application must maintain a slot 1 ENIU and uses an AC power-supply, the RX3i system must have the RX3i AC power-supply located in a slot to the right of the RX3i ENIU in slot 1.

Locating the ENIU in a Slot Other than 1

Before deciding to place the ENIU in a slot other than slot 1, it is important to consider the possible application migration issues that could arise, as explained below.

Application Program

For Service Request #15 (Read Last-Logged Fault Table Entry) and Service Request #20 (Read Fault Tables), the location of ENIU faults is not the standard 0.1 location, but the slot the ENIU is located in (see above). Logic that decodes fault table entries retrieved by these service requests may need updating.

COMMREQs directed to the ENIU (e.g. those directed to the serial ports of the ENIU) will need to be updated with the correct ENIU slot reference.

Hardware Configuration

The slot location of the ENIU must be updated in the hardware configuration to reflect the ENIU's true location.

Fault Tables

Faults logged for the ENIU in the fault table will not in the standard 0.1 (backplane.slot) location, but will reflect the ENIUs actual slot.

Series 90 PLCs

Remote Series 90 PLCs that use SRTP Channels COMMREQs expect the ENIU to be in slot 1 or slot 2. To support communications with Series 90 SRTP clients such as Series 90 PLCs using SRTP Channels, the RX3i internally redirects incoming SRTP requests destined for {backplane 0, slot 1} to {backplane 0, slot 2}, provided that the ENIU is located in backplane 0 slot 2 (and the remote client has not issued an SRTP Destination service on the connection to discover the backplane and slot of the ENIU). This special redirection permits Series 90-30 applications that expect the power supply to be located leftmost and the ENIU to be located to the right of the power supply to function. Attempts to establish channels with ENIUs in slots other than 1 or 2 will fail if initiated from Series 90 PLCs.

HMI and External Communication Devices

All external communication devices that interact with the ENIU should be checked for compatibility with ENIU slot locations other than slot 1. Problems may arise with, but are not limited to, initial connection sequences and fault reporting. Machine Edition View users should select "GE SRTP" as their communications driver – it can communicate with a ENIU in any slot.

Programmer Connection

The programmer can communicate with the NIU via serial port 1, serial port 2, or the backplane-based Ethernet interface. Connecting a programmer via an Ethernet TCP/IP network requires a CAT5 standard Ethernet cable with RJ-45 connectors.

Before connecting the programmer and ENIU to the Ethernet TCP/IP network, set the IP address using the Initial IP Address software tool. After setting the IP address, connect the RX3i and the computer running the programming software to the Ethernet Interface. For detailed information on programmer connection via Ethernet TCP/IP, refer to the *TCP/IP Ethernet Communications for PACSystems User's Manual,* GFK-2224.

Firmware Upgrades

The ENIU uses non-volatile flash memory for storing the operating system firmware. This allows firmware to be updated without disassembling the module or replacing EPROMs.

To install a firmware upgrade, connect WinLoader to the NIU RS-232 or RS-485 serial port. When connecting directly to the NIU, there is no need to specify the Backplane/Slot location. For upgrades to smart modules (the IC695ETM001, for example), which are performed indirectly via the NIU serial port, you must specify a backplane/slot location.

Serial Ports

The NIU has two independent, on-board serial ports, accessed by connectors on the front of the module. These ports provide serial interfaces to external devices.

Protocols Supported

Protocol	*Port 1*	*Port 2*
RTU (slave)	Yes	Yes
SNP Slave	Yes	Yes
Serial I/O *	Yes	Yes
Firmware Upgrade	ENIU in STOP/No I/O mode	
Message Mode (C Runtime Library Functions: serial read, serial write, sscanf, sprintf)	Yes	Yes

* Modbus Master is supported in application code in Serial I/O mode.

Serial Port Baud Rates

Protocol	*Port 1 (RS-232)*	*Port 2 (RS-485)*
Modbus RTU Slave protocol	1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K	
Message	1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K	
Firmware Upgrade via Winloader	2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K	
SNP Slave	1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K	
Serial I/O	1200, 2400, 4800, 9600, 19.2K, 38.4K, 57.6K, 115.2K	

Port 1

Port 1 (COM1) is RS-232 compatible. It has a 9-pin, female, D-sub connector with a standard pin out. This is a DCE (data communications equipment) port that allows a simple straight-through cable to connect with a standard AT-style RS-232 port. The COM1 Active LED provides the status of serial port activity.

Port 1 RS-232 Signals

Pin	*Signal*	*Description*
1*	NC	No Connection
2	TXD	Transmit Data
3	RXD	Receive Data
4	DSR	Data Set Ready
5	0V	Signal Ground
6	DTR	Data Terminal Ready
7	CTS	Clear To Send
8	RTS	Request to Send
9	NC	No Connection

* Pin 1 is at the bottom right of the connector as viewed from the front of the module.

Port 2

Port 2 (COM2) is RS-485 compatible. Port 2 has a 15-pin, female D-sub connector. This port supports the RS-485 to RS-232 adapter (IC690ACC901). This is a DCE port. The COM2 Active LED provides the status of serial port activity.

Port 2 RS-485 Signals

Pin	*Signal*	*Description*
1*	Shield	Cable Shield
2	NC	No Connection
3	NC	No Connection
4	NC	No Connection
5	+5VDC	Logic Power**
6	RTS(A)	Differential Request to Send
7	0V	Signal Ground
8	CTS(B‘)	Differential Clear To Send
9***	RT	Resistor Termination
10**	RD(A‘)	Differential Receive Data
11	RD(B‘)	Differential Receive Data
12	SD(A)	Differential Send Data
13	SD(B)	Differential Send Data
14	RTS(B)	Differential Request To Send
15	CTS(A’)	Differential Clear To Send

* Pin 1 is at the bottom right of the connector as viewed from the front of the module.

** Pin 5 provides isolated +5VDC power (300mA maximum) for powering external options.

*** Termination resistance for the RD A’ signal should be connected on units at the end of the line. To make this termination, connect a jumper between pins 9 and 10 inside the 15-pin D-shell.

Serial Cable Lengths and Shielding

The connection from a NIU serial port COM1 to the serial port on a computer or other serial device requires a serial cable. This connection can be made with the IC200CBL001 cable kit or you can build cables to fit the needs of your particular application. See the *Ethernet NIU Reference Manual,* GFK-2296 for more information on serial communications, cables, and converters.

Maximum cable lengths (the total length from the NIU to the last device attached to the serial cable) are:

- Port 1 (RS-232) – 15 meters (50 ft.), shielded cable optional
- Port 2 (RS-485) – 1200 meters (4000 ft.), shielded cable required

Installation in Hazardous Locations

- EQUIPMENT LABELED WITH REFERENCE TO CLASS I, GROUPS A, B, C & D, DIV. 2 HAZARDOUS LOCATIONS IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C, D OR NON-HAZARDOUS LOCATIONS ONLY
- WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2;
- WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES; AND
- WARNING - EXPLOSION HAZARD - DO NOT CONNECT OR DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.

Configuration

The RX3i NIU and I/O system is configured with Machine Edition PLC-Logic Developer programming software.

Machine Edition automatically populates the Ethernet NIU target in the folder with the required application code blocks, and partially prepoulates the EGD Exchanges that are required for ENIU operation.

The NIU verifies the actual module and backplane configuration at power-up and periodically during operation. The actual configuration must be the same as the programmed configuration. Deviations are reported to the NIU alarm processor function for configured fault response. Refer to the *Proficy Machine Edition Logic Developer-PLC Getting Started Manual,* GFK-1918 and the online help for a description of configuration functions.

LED Operation

The following table lists the NIU LED functions during normal operation (after initialization sequence is complete).

LED State ● On ✱ Blinking ○ Off			***NIU Operating State***
●	**NIU OK**	On	NIU has passed its powerup diagnostics and is functioning properly.
○	**NIU OK**	Off	NIU problem. RUN and OUTPUTS ENABLED LEDs may be blinking in an error code pattern, which can be used by technical support for troubleshooting. This condition and any error codes should be reported to your technical support representative.
✱	**NIU OK**, **OUTPUTS ENABLED, NIU SCANNING I/O**	Blinking in unison	NIU is in boot mode and is waiting for a firmware update through serial port.
●	**NIU SCANNING I/O**	On	NIU is in Run mode
○	**NIU SCANNING I/O**	Off	NIU is in Stop mode.
●	**OUTPUTS ENABLED**	On	Output scan is enabled.
○	**OUTPUTS ENABLED**	Off	Output scan is disabled.
●	**I/O FORCE**	On	Override is active on a bit reference.
✱	**BATTERY**	Blinking	Battery is low.
●	**BATTERY**	On	Battery is dead or not attached.
●	**SYSTEM FAULT**	On	NIU is in Stop/Faulted or Stop/Halted mode.
✱	**COM1** **COM2**	Blinking Blinking	Signal activity on port.

Specifications for IC695NIU001

Battery: Memory retention	For estimated battery life under various conditions, refer to the *PACSystems NIU Reference Manual,* GFK-2222.
Power requirements	+3.3 VDC: 1.25 Amps nominal +5 VDC: 1.0 Amps nominal
Operating Temperature	0°C to 60°C (32°F to 140°F)
Floating point	Yes
Embedded communications	RS-232, RS-485
Serial Protocols supported	Modbus RTU Slave, SNP, Serial I/O, Modbus RTU Master by application “C” block
Backplane	Dual backplane bus support: RX3i PCI and 90-30-style serial
PCI compatibility	System designed to be electrically compliant with PCI 2.2 standard

For environmental specifications and compliance to standards (for example, FCC or European Union Directives), refer to the *PACSystems RX3i Hardware and Installation Manual,* GFK-2314.

Ordering Information

Description	***Catalog Number***
RX3i Ethernet Network Interface Unit	IC695NIU001
RX3i Ethernet Module	IC695ETM001
Package consisting of RX3i Ethernet NIU IC695NIU001 and one Ethernet Transmitter Module IC695ETM001	IC695NTK001
Package consisting of RX3i Ethernet NIU IC695NIU001 and two Ethernet Transmitter Modules IC695ETM001	IC695NTK002
Lithium Battery Pack	IC698ACC701
Auxiliary Battery Module (optional)	IC693ACC302
RX3i Power Supply, 40 Watt High Capacity Universal AC Power Supply	IC695PSA040
RX3i Power Supply, 40 Watt High Capacity 24 VDC Power Supply	IC695PSD040
RX3i Multi-Purpose Power Supply, 40 Watt High Capacity Universal AC	IC695PSA140
RX3i Multi-Purpose Power Supply, 40 Watt High Capacity 24 VDC	IC695PSD140
[Optional] RS-232 Cable	IC200CBL001
Rx3i Standard 12 Slot Backplane	IC695CHS012
Rx3i Standard 16 Slot Backplane	IC695CHS016

Note: For Conformal Coat option, please consult the factory for price and availability.

Release History

Catalog Number	***FW Revision***	***Comments***
IC695NIU001-AA	3.50	Initial Release
IC695NIU001-AB	3.51	
IC695NIU001-AC	3.52	
IC695NIU001-BD	3.81	Support for eight ETM modules in PLC main backplane.
IC695NIU001-BE	3.82	

Release Information

Hardware ID:	***Catalog Number***	***Board ID***	***Board Revision***
IC695NIU001 ENIU	IC695NIU001-BE	CP4A1	44A751862-G01R11
Ethernet TCP Firmware ID: Version: 3.82 BOC Rev 0106 Build 10A1		***Ethernet Boot Firmware ID:*** Version: 3.50 Build 31A1	
Upgrade Kit: 44A753013-G04	IC695NIU001 is field upgradeable to firmware version 3.81 using the firmware upgrade utility		

Functional Compatibility

Product	***Compatible Versions***
Proficy® Machine Edition Logic Developer	Machine Edition Logic Developer 5.5 with Service Pack 1 is required to use the eight ETM feature. Release 5.5 SIM 1 or later is required to enable use of the RX3i Ethernet NIU. Machine Edition Logic Developer 5.5 with Service Pack 1 is required to use the eight ETM feature with the RX3i Ethernet NIU.
Backplanes, power supplies, and system modules	As listed in the PACSystems RC3i System Manual, GFK-2314C or later.

New Features for this Release

- ***Higher precision when setting Time of Day clock.*** In previous releases, the value passed to the Set Time of Day service request function, SVC_REQ 7 (Change the Time of Day Clock), was rounded to the nearest 0.5 second. Releases 3.82 and later provide greater accuracy by no longer rounding the value passed into the SET_TOD service request function.
- ***Boolean Inputs to PID function block (MAN, UP, or DN) are no longer required***, providing more compatibility with Series 90-70 operation. This makes converting from a Series 90-70 project easier.

Resolved for this Release

- ***Improved accuracy for Ethernet Global Data timestamps when the CPU loses connection to the SNTP Server***. For release 3.82 and later, if the source of EGD timestamps is configured to be an SNTP server but the SNTP server becomes unavailable, the CPU calculates timestamps based on the last valid synchronized time, not on the CPU clock.
- ***A Jump Instruction can now be placed in middle of a logic rung,*** for example, as the EQ output of a CMP REAL function block. For earlier versions of the firmware, executing a jump from the middle of a rung caused the CPU to go into STOP-HALT mode.

Restrictions

Subject	***Description***
Battery installation	When installing a new battery, if no battery is currently installed, the new battery must be installed while the ENIU has power. Failing to follow this procedure could result in the ENIU not powering up. Recommendation: remove the battery, power-cycle the ENIU, then re-install the battery.
Ethernet Disconnect During Word for Word Change	If the Ethernet connection is broken during a word–for-word change, the programmer may not allow a subsequent word-for-word change after reconnecting. Recommendation: go offline and then back online again.
Simultaneous Clears, Loads and Stores Not Supported	Multiple programmers may not change ENIU contents at the same time. The programming software may generate an error during the operation. Simultaneous loads from a single ENIU are allowed.
Power Cycle During Write to Flash	The ENIU is configured to power up from flash and if is power-cycled while writing to flash, a fault is generated on power up.
Hardware	If a hardware configuration is stored to flash that sets “Logic/Config Power up Source” to

Subject	Description
Configuration Not Equal After Changing Target Name	"Always Flash" or "Conditional Flash" and the name of the target is subsequently changed in the programming software, the hardware configuration will go Not Equal and will not Verify as equal.
PLC and IO Fault Tables May Need to be Cleared Twice to Clear Faulted State	Both PLC and IO fault tables may need to be cleared to take the ENIU out of Stop/Fault mode. If one of the tables contains a recurring fault, the order in which the tables is cleared may be significant. Recommendation: if the ENIU is still in Stop/Fault mode after both tables are cleared, try clearing the fault tables again.
Setting Force On/Off by Storing Initial Value	After a force on or force off has been stored to the ENIU, it cannot be switched from force on to force off or vice-versa by downloading initial values. Recommendation: turn off the force by doing a download, and then change the force on or off by another download.
Number of Active Programs Returned as Zero	The SNP request Return Controller Type and ID currently returns the number of active programs as zero.
Serial I/O Failure at 115K During Heavy Interrupt Load	Rarely, data corruption errors occur during serial communications when running at 115K if there is a heavy interrupt load on the ENIU. Recommendation: under heavy load applications, restrict serial communications to 57K or lower.
SNP ID not always provided	Unlike the Series 90-30, the RX3i ENIU's SNP ID does not appear in the Machine Edition programmer Show Status display. Service Request 11 will always return zeros.
Second programmer can change logic while in Test & Edit mode	While currently active in a Test and Edit session using Machine Edition on one PC, Machine Edition running on another PC is not prevented from storing new logic to the ENIU.
ENIU may not detect low-battery condition	PACSystems ENIUs may not detect a low-battery condition early enough to provide a meaningful warning to replace the battery. A battery with very low capacity may still have a terminal voltage high enough to report that it is a good battery. When the battery starts supplying the memory power (battery backup), the battery voltage quickly drops to unacceptable levels, and it may fail. Recommendation: replace batteries in accordance with the guidelines provided in the CPU Reference Manual, GFK-2222. In addition, logic and hardware configuration can be saved to flash.
Two loss of module faults for Universal Analog Module	Occasionally, the hot removal of the Universal Analog Input Module (IC695ALG600) results in two "Loss of I/O Module" faults instead of one.
Power up of Series 90-30 HSC module may take up to 20 seconds	As power is applied to a 90-30 High-Speed Counter, the "module ready" bit in the status bits returned each sweep from the module may not be set for as long as 20 seconds after the first ENIU sweep, even though there is no "loss of module" indication. I/O data exchanged with the module is not meaningful until the module has set this bit.
Info fault at power up	Intermittently during power-up, an Informational non-critical ENIU software fault may be generated with fault extra data of 01 91 01 D6. This fault has no effect on the normal operation of the ENIU. But if the hardware watchdog timer expires after this fault and before power has been cycled again, the outputs of I/O modules may hold their last state, rather than defaulting to zero.
Extended Memory Types for I/O Triggers	%R, %W and %M cannot be used as I/O triggers.
Possible ME inability to connect	Infrequently, an attempt to connect a programmer to an ENIU via Ethernet is unsuccessful. The normal connection retry dialog is not displayed. Recommendation: Reboot the computer that is running the programmer.
SNP Update Datagram message	If an Update Datagram message requests 6 or fewer bits or bytes of data, the ENIU returns a Completion Ack without Text Buffer. The protocol specifies that the returned data should be in the Completion Ack message, but it may not be.
GBC30 may not resume operation after power cycle	In rare instances, a GBC30 in an expansion backplane may not resume normal operation after a power cycle of either the expansion backplane or the main backplane.
Configuration of third-party modules	Do not specify a length of 0 in the configuration of a third-party module. The module will not work properly in the system.
Power supply status after ENIU firmware update	The ENIU reports a "Loss of or missing option module" fault for the IC695PSD140 RX3i power supply following an update of ENIU firmware. The slot appears empty in the programmer's online status detail view. The power supply continues to operate normally. Recommendation: Power cycle to restore normal status reporting.

Subject	*Description*
Power supply status after power cycling	Rarely, turning a power supply on or off may not result in an add or loss fault. Also, the slot will appear empty in the programmer's online status detail view. The power supply continues to operate normally. Power cycle to restore normal status reporting.
Missing "Loss of terminal block" fault	The IC695ALG600/608/616 analog input modules do not produce a "Loss of terminal block" fault if the hardware configuration is stored or the module is hot-inserted when the terminal block is not locked into place.
Sequence Store Failure	Writing a very large hardware configuration to flash may cause a "PLC Sequence Store Failure" error. To work around this error, either: 1. Perform an explicit clear of flash prior to performing the write. 2. Increase the operation timeout used by ME prior to performing the write.
IC694MDL754: Must configure module status bits	Always configure 16 bits of module status when using this module. Configuring 0 bits of module status will result in invalid data in the module's ESCP status bits.
PID algorithm	If bit 2 is set to 1 and bit 0 is set to 1, the product will operate in a manner opposite to the description in user manual GFK-2222D or earlier. The derivative term is added when it should be subtracted.
IC695ALG600 Lead Resistance Compensation setting	A configuration store operation fails if a channel is configured for 3-wire RTD with Lead Resistance Compensation set to Disabled. A Loss of Module fault is logged in the I/O Fault table at the end of the store operation. Recommendation: to recover the lost module, change the configuration to enable Lead Resistance Compensation and power-cycle the module.
C Toolkit PlcMemCopy Documentation Incorrect	This routine does allow the destination and source pointers to be outside of reference memory. If the destination points to discrete reference memory, overrides and transitions are honored.

Operating Notes

Subject	Description
LD-PLC operations	To perform a download to the ENIU, you must first connect to the ENIU. The connect and download functions are now separate in Machine Edition LD-PLC .
Logic Executed in Row Major Instead of Column Major	Logic execution in PACSystems RX3i is performed in row major order (similar to the Series 90-30). This is different from the Series 90-70, that executes in column major order. This means that some complicated rungs may execute slightly differently on PACSystems RX3i and Series 90-70. For specific examples, see the programming software on-line help.
NaN Handled Differently Than in 90-30	The PACSystems RX3i ENIU may return slightly different values for Not A Number than a Series 90-30 ENIU. In these exception cases (e.g., 0.0/0.0), power flow out of the function block is identical to Series 90-30 operation and the computed value is still Not A Number.
PID Algorithm Improved	The PID algorithm used in PACSystems has been improved and therefore PID will function slightly differently on PACSystems RX3i than on the Series 90-30. For RX3i, the elapsed time is computed in units of 100µS instead of 10mS. This smoothes the output characteristic, eliminating periodic adjustments that occurred when the remainder accumulated to 10mS. In addition, previous non-linear behavior when the integral gain is changed from some value to 1 repeat/second was eliminated.
Some Service Requests different from 90-30 or no longer supported	• Service Requests 6, 15, and 23 have slightly different parameters. Refer to GFK-2222. • PACSystems ENIUs support Service Request 26/30 functionality via fault locating references. • Service Request 13 requires a valid value in the input parameter block (Refer to GFK-2222 for details). On the Series 90-30 and Series 90-70 the parameter block value was ignored. • Service Requests 48 and 49 are no longer supported (there is no auto-restart) because most faults can be configured to be not fatal.
IL and SFC	IL and SFC are not available.
DO I/O Instruction	The Series 90-30 Enhanced DO I/O instruction is converted to a standard DO I/O instruction (the ALT parameter is discarded and ignored.)
END Instruction	The Series 90-30 END instruction is not supported. Use alternate programming techniques.
Non-nested JUMP, LABEL, MCR, & ENDMCR Instructions	Non-nested JUMPs, LABELs, MCRs, & ENDMCRs are translated to the corresponding nested JUMPs, LABELs, MCRs, & ENDMCRs when converting from Series 90-30 to PACSystems RX3i.

Subject	Description
Changing IP Address of Ethernet Interface While Connected	Storing a hardware configuration with a new IP address to the RX3i while connected via Ethernet will succeed, then immediately disconnect because the RX3i is now using a different IP address than the Programmer. You must enter a new IP address in the Target Properties in the Machine Edition Inspector window before reconnecting.
Duplicate Station Address for Modbus Will Conflict with Other Nodes	The default serial protocol for the RX3i is Modbus RTU. The default Station Address is 1. If the ENIU is added to a multi-drop network, care must be taken that the ENIU is configured with a unique Station Address. Nodes with duplicate Station Addresses on the same network will not work correctly.
Timer Operation	Care should be taken when timers (ONDTR, TMR, and OFDTR) are used in program blocks that are NOT called every sweep. The timers accumulate time across calls to the sub-block unless they are reset. They function like timers operating in a program with a much slower sweep than the timers in the main program block. For program blocks that are inactive for large periods of time, the timers should be programmed to account for this catch up feature. Related to this are timers that are skipped because of the use of the JUMP instruction. Timers that are skipped will NOT catch up and will therefore not accumulate time in the same manner as if they were executed every sweep.
Large Number of COMMREQs Sent to Module in One Sweep Causes Faults	A large number of COMM_REQs (typically more than 8) sent to one module in the same sweep may cause Module Software faults to be logged in the PLC fault table. The fault group is MOD_OTHR_SOFTWR (16t, 10h) and the error code is COMMREQ_MB_FULL_START (2). The "FT" output of the function block is also set. Recommendation: Spread multiple COMMREQs to the same module across multiple sweeps so that fewer (typically 8 or less) are sent to the module in each sweep. Also, check the FT output parameter for errors. If the FT output is set (an error has been detected), the COMMREQ could be re-issued by the application logic.
C Block Standard Math Functions Do Not Set errno	In C Blocks, standard math functions (e.g. sqrt, pow, asin, acos) do not set errno to the correct value and do not return the correct value if an invalid input is provided.
Hot Swap	Hot Swap of power supplies or ENIUs is not supported in this release
Serial Port Configuration COMMREQs	With the following combination of circumstances, it is possible to render serial communications with the ENIU impossible: 1. User configuration disables the Run/Stop switch 2. User configures the power up mode to Run or Last 3. Logic is stored in FLASH and user configures ENIU to load from FLASH on power up 4. User application issues COMMREQs that set the protocol on both of the serial ports to something that does not permit communications to the ME programmer.
Incorrect COMMREQ Status For Invalid Program Name	The program name for PACSystems is always "LDPROG1". When another program name is used in a COMMREQ accessing %L memory, an Invalid Block Name (05D5) error is generated.
FANUC I/O Master and Slave operation	Scansets on the master do not work properly for the first operation of the scanset after entering RUN mode. They do work properly for subsequent scans. After downloading a new hardware configuration and logic, a power cycle may be required to resume FANUC I/O operation. Use ENIUs of similar performance in FANUC I/O networks. If a master or slave is located in an RX3i system, the other ENIUs should be RX3is or Series 90-30 CPU374s. Repeated power up/down cycles of an expansion backplane containing FANUC I/O slaves may result in failure of the slaves' operation, with the RDY LED off.
Lost count at power up for Serial IO Processor	The serial IO Processor (IC693APU305) will lose the first count after every power up or every time the module receives a configuration.